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NP-33-03-012-00

Docket No. 50-346

License No. NPF-3

November 24, 2003

United States Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Ladies and Gentlemen:

LER 2003-012-00
Davis-Besse Nuclear Power Station, Unit No. 1
Date of Occurrence – September 23, 2003

Enclosed please find Licensee Event Report (LER) 2003-012, which is being submitted to provide written notification of a condition prohibited by Technical Specification 3.0.4 in which the transition from Mode 4 to Mode 3 occurred with an inoperable train of Auxiliary Feedwater. The train of Auxiliary Feedwater was inoperable due to non-functional steam traps in the turbine steam supply piping, and the resultant moisture accumulation resulted in an unsatisfactory response time test for the turbine. This LER is being submitted in accordance with 10CFR50.73(a)(2)(i)(B) as a condition or operation prohibited by the Technical Specifications. Commitments associated with this LER are listed in the Attachment.

Very truly yours,

GMW/s

Attachments

cc: Regional Administrator, USNRC Region III
DB-1 NRC Senior Resident Inspector
DB-1 Senior Project Manager, USNRC
Utility Radiological Safety Board

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COMMITMENT LIST

The following list identifies those actions committed to by the Davis-Besse Nuclear Power Station in this document. Any other actions discussed in the submittal represent intended or planned actions by Davis-Besse. They are described only as information and are not regulatory commitments. Please notify the Manager - Regulatory Affairs (419-321-8450) at Davis-Besse of any questions regarding this document or associated regulatory commitments.

	COMMITMENTS	DUE DATE
1.	Revise the Plant Heatup Operating Procedure (DB-OP-06900) to maintain Auxiliary Feedwater Pump Turbine steam supply piping steam traps ST133 and ST134 in the startup mode until the plant reaches power operation.	1. Prior to entry into Mode 3
2.	Inspect and repair as necessary the remaining five steam traps in the steam supply piping for the Auxiliary Feedwater Pump Turbines.	2. Prior to entry into Mode 3
3.	Create Preventive Maintenance Activities to institute periodic inspection and repair of the Auxiliary Feedwater System steam traps.	3. March 20, 2004

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
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4. TITLE

Auxiliary Feedwater Pump Turbine Inoperable due to Degraded Steam Traps

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
09	23	2003	2003	-- 012 --	00	11	24	2003	FACILITY NAME	DOCKET NUMBER 05000

9. OPERATING MODE	3
10. POWER LEVEL	000

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)
20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER Specify in Abstract below or in NRC Form 366A
20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	
20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	50.73(a)(2)(v)(D)	
20.2203(a)(2)(v)	X 50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Gerald M. Wolf, Staff Engineer - Licensing	(419) 321-8001

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED			15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE).	X	No				

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

On September 23, 2003, with the plant in Mode 3, Auxiliary Feedwater Pump Turbine (AFPT) 1 failed response time testing and was declared inoperable. While the initial cause was believed to be improper setting of the turbine governor during an overhaul at the beginning of the outage, additional testing and troubleshooting led to the discovery of excessive moisture in the steam supply piping. Two steam traps in the AFPT steam supply piping were found to be degraded, one to the point that it was no longer functional. Because both AFPTs were not operable per Technical Specification 3.7.1.2 during the transition from Mode 4 to Mode 3, this condition represents a condition prohibited by Technical Specification 3.0.4 and is being reported in accordance with 10 CFR 50.73(a)(2)(i)(B) as any operation or condition prohibited by the Technical Specifications. Corrective actions include repair of the subject steam traps, revision of the plant heatup operating procedure to maintain steam traps in the steam supply piping in startup mode until the plant achieves power operation, and creation of preventive maintenance activities to periodically inspect and repair the Auxiliary Feedwater System steam traps.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

DESCRIPTION OF OCCURRENCE:

On September 23, 2003, with the Davis-Besse Nuclear Power Plant (DBNPS) in Mode 3 and the Reactor at 0 percent power, a test of the Reactor Coolant System (RCS) [AB] was in progress. This test consisted of heating the RCS utilizing non-nuclear heat to normal no-load operating temperature and normal operating pressure (NOT/NOP). These conditions were then held for approximately seven days to examine the RCS for leakage. Refer to DBNPS Serial Letter 2973 for additional information on this test.

With the RCS at NOT/NOP, routine testing of the Auxiliary Feedwater (AFW) System [BA] was conducted to verify operability per the DBNPS Technical Specifications. On September 23, 2003, AFW Train 1 did not perform satisfactorily during Steam Feedwater Rupture Control System (SFRCS) [JB] response time testing being performed to satisfy Technical Specification Surveillance Requirement 4.3.2.2.3. Specifically, upon a test actuation signal from the SFRCS, Auxiliary Feedwater Pump Turbine (AFPT) 1 did not reach a speed of 3666 revolutions per minute (RPM) within 40 seconds.

The AFW system provides feedwater to the steam generators for the removal of reactor decay heat in the absence of main feedwater [SJ] and/or to promote natural circulation of the RCS in the event of a loss of all four reactor coolant pumps.

The SFRCS is designed to automatically start the AFW System on the loss of both main feedwater pumps or the loss of all four reactor coolant pumps (including loss due to a loss of electric power). The SFRCS is also designed to isolate the affected steam generator and to automatically start the AFW System in the event of a main steam line or main feedwater line rupture, and to prevent steam generator overfill and subsequent spillover into the main steam lines.

Technical Specification 3.7.1.2 requires that two trains of auxiliary feedwater shall be operable while in Modes 1-3. With one train of Auxiliary Feedwater inoperable, the Technical Specification Action requirement is to restore the train to operable status within 72 hours or be in Hot Shutdown within the next 12 hours. Additionally, in License Amendment Request 2003-008 (Serial Letter 2950), the DBNPS committed to initiate a cooldown within two hours in the event equipment important in reducing the risk associated with the inability of the High Pressure Injection (HPI) pumps to maintain suction from the containment emergency sump becomes inoperable. The AFW System is included in this equipment. This commitment is related to DBNPS Technical Specification Amendment 257 which allowed a one-time exception, during the DBNPS Restart Test Plan, to allow entry into Mode 3 without the HPI pumps being able to take suction from the low pressure injection trains when aligned for containment sump recirculation.

On September 23, 2003, at 0011 hours, the measured response time of AFW Train 1 was 40.16 seconds. Since this value was greater than the test procedure acceptance criteria, AFW Train 1 was declared inoperable. Because of a concern that the timing may have been inaccurate due to communication issues, the test

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* **(17)**

DESCRIPTION OF OCCURRENCE: (Continued)

was re-performed at 0143 hours, and the measured response time was 38.21 seconds. Since this second test was within the test procedure acceptance criteria, AFW Train 1 was declared operable.

At 0325 hours, Engineering personnel informed Operations that the overall response time of AFW Train 1 needs to also include an additional 1.9 seconds to account for the longest SFRCS instrumentation response time. With this additional time, AFW Train 1 did not meet the 40-second requirement of the Technical Requirements manual, and was therefore declared inoperable. Two additional tests were performed with limited success, and based on input from Engineering, at 0522 hours, adjustments were made to the AFPT 1 governor [BA-65] to decrease the response time of AFW Train 1. Following the adjustments, three successive response time tests were performed satisfactorily, and AFW Train 1 was declared operable at 0937 hours. Because AFPT 1 governor had been overhauled at the start of the refueling outage, it was believed that these governor adjustments were all that was required to restore operability.

On September 24, 2003, response time testing was performed for AFW Train 1 in order to confirm operability. The response time for the first test exceeded the 40-second requirement, and significant water was noted coming from the sentinel valve on the exhaust piping of the turbine. While two additional tests were performed with acceptable response times and with no water observed, there was no confidence that the AFW Train 1 response time would meet requirements after sitting idle for a period of time. Therefore, further repairs were made to the AFPT governor. On September 26, 2003, at 0440 hours, AFW Train 1 was declared operable following additional maintenance on the AFPT 1 governor and additional testing. As part of this final testing evolution, steam traps [BA-TRP] associated with the steam supply to AFPT 1 were partially bypassed to ensure any condensate was removed from the steam lines.

On October 17, 2003, two of the steam traps in the steam supply line to AFPT 1 were disassembled and inspected because of the problems previously encountered during testing. The internals of the steam trap just upstream of the turbine steam admission valve were degraded to the point that the steam trap was no longer functional. The internals of the other steam trap located further upstream of the turbine were also degraded, reducing its performance. The conditions of these steam traps resulted in inadequate condensate removal capacity from the steam supply line. These steam traps were subsequently repaired.

APPARENT CAUSE OF OCCURRENCE:

The cause for the inability of AFW Train 1 to consistently meet response time testing requirements was excessive moisture in the steam supply piping. Poor steam quality can cause degraded turbine response time, and in the extreme, may result in an overspeed trip of the turbine.

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APPARENT CAUSE OF OCCURRENCE: (Continued)

Turbine casing and trip throttle valve drains had been opened prior to the performance of the initial two time response tests, however, during the subsequent runs on September 23, 2003, the drains remained closed, causing condensate accumulation. The drains were opened to drain condensate and then closed prior to the fifth test, which demonstrated improved turbine performance. Subsequent to governor adjustments, three successful tests were performed; however, at this point steam quality had been improved via sustained flow through the turbine steam supply lines.

On September 26, 2003, after provisions were made to remove excess moisture by opening steam trap bypass valves, a significant change in the response of the turbine was observed. A graph of the pre-maintenance turbine response showed a dip in speed while increasing to rated speed and a stable rated speed was reached in approximately 25 seconds. The post-maintenance response had no corresponding dip in speed and reached a stable rated speed in approximately 20 seconds.

Performance of the AFPT steam supply piping steam traps is monitored using infrared thermography on a six-month interval when the plant is operating to identify steam traps with performance problems. However, there is currently no preventive maintenance program to supplement the thermography readings. One of the degraded steam traps had last been rebuilt in April 2000; the other steam trap that was more degraded was last rebuilt in May 1995. The degradation of these steam traps was the primary cause for the inoperability of AFPT 1.

ANALYSIS OF OCCURRENCE:

The degradation observed for the steam traps in the steam supply lines for AFPT 1 was not instantaneous, and occurred over a period of time. While the impact of the degraded steam traps on the operability of AFPT 1 during plant operation in the past is not known, these degraded steam traps were non-functional during the transition from Mode 4 to Mode 3 on September 15, 2003. Technical Specification 3.0.4 states that entry into an operational mode or other specified applicability condition shall not be made unless the conditions of the Limiting Condition for Operations are met without reliance on provisions contained in the ACTION statements unless otherwise excepted. Transitioning from Mode 4 to Mode 3 with an inoperable Auxiliary Feedwater Pump is a condition prohibited by Technical Specification 3.0.4 and is reportable in accordance with 10 CFR 50.73(a)(2)(i)(B). 10 CFR 50.73(a)(2)(i)(B) requires reporting any operation or condition prohibited by the plant's Technical Specifications.

While AFW Train 1 did not reach rated speed in the required time, it would have provided feedwater to the steam generators as pump speed increased. This addition of feedwater more than compensated for the slower response time, and as a result, AFW Train 1 was able to accomplish its design function to mitigate a loss of feewater accident as assumed in the accident analysis. Additionally, due to the significantly lower decay heat present in the reactor core due to the extended shutdown, there was additional margin available. Consequently, the failure of AFW Train 1 to respond as assumed in the loss of feedwater analysis within 40 seconds had negligible safety significance.

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CORRECTIVE ACTIONS:

On September 26, 2003, six steam traps in the steam supply piping to AFPT 1 were bypassed in order to restore operability of AFPT 1. The Plant Heatup Operating Procedure (DB-OP-06900) will be revised prior to entry into Mode 3 to maintain AFPT steam supply piping steam traps ST133 and ST134 in the startup mode until the plant reaches power operation.

There are 15 steam traps in the steam supply piping for the two AFPTs. Eight of these steam traps have been inspected and repaired as a result of this event, including steam traps ST133 and ST139. Two steam traps were previously replaced during the thirteenth refueling outage due to through-leakage and do not require inspection/repair. The remaining five steam traps in the steam supply piping for the AFPTs will be inspected and repaired as necessary prior to entry into Mode 3.

Preventive Maintenance Activities will be created by March 20, 2004, to institute periodic inspection and repair of the AFW System steam traps.

FAILURE DATA:

DBNPS LER 03-011 also documented a condition prohibited by Technical Specification 3.0.4 due to transitioning from Mode 5 to Mode 3 with an inoperable Containment Spray Pump. The corrective actions taken for the Containment Spray Pump 1 Breaker were associated with the false trip of the ground fault function of the circuit breaker overcurrent device. These corrective actions could not have prevented this current event involving inoperable steam traps in the steam supply piping of Auxiliary Feedwater Pump Turbine 1.

There have been no LERs in the previous three years involving the Auxiliary Feedwater System at the DBNPS.

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

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